

**ABSTRACT OF THE DISCLOSURE**

A methodology for converting venous blood values to arterial blood values provides the advantage of obviating the need for taking arterial blood samples. The method entails (i) measuring arterial oxygenation, (ii) measuring and estimating values of venous blood acid/base status and oxygenation status of a venous blood sample, and (iii) converting the venous blood values by applying a mathematical model for deriving blood acid/base status and oxygenation status into estimated arterial blood values.